

REMARKS

In view of the remarks below, Applicant respectfully requests reconsideration of the final rejections in the Office Action dated March 24, 2004.

Sekine Does Not Teach the Recited Sequence

The Examiner has rejected Claims 6-12, 29 and 30 as being anticipated under 35 U.S.C. § 102(e) by Sekine et al. (U.S. Patent No. 5,622,888). In particular, the Examiner states that after making the silicon electrode rugged (pointing to element 73a in FIG. 3(b)) Sekine teaches replacing the silicon in the silicon structure with a metal to thereby form a textured metal electrode (pointing to element 73b of FIG. 3(b)). Additionally, the Examiner points to Sekine's teaching of the rugged structure silicon atoms comprising HSG (pointing to column 1, lines 55-57).

Applicant respectfully submits that the Examiner bases the rejections upon an incorrect understanding of Sekine. Independent Claim 6 of the present application recites a "making the silicon electrode structure rugged," and "*after making the silicon electrode rugged*, replacing the silicon in the rugged silicon electrode structures, thereby forming a metal rugged electrode." The claim clearly recites a sequence in which a rugged silicon electrode structure is first formed and subsequently a replacement reaction is performed.

In contrast, contrary to the Examiner's assertions, Sekine teaches depositing "a phosphorous-doped amorphous polysilicon layer" which is then "patterned into a lower capacitive electrode 2 by ordinary lithography/etching." Column 5, lines 10-14. Nowhere is it taught that the lower capacitive electrode 2 is rugged, nor is it shown as such in FIG. 3(a).

A substitution reaction is then conducted, "thereby replacing a surface layer of the phosphorous-doped amorphous polysilicon with a *tungsten layer 73a* as shown in FIG. 3(b)." Column 5, lines 25-27. Whereas the rejections state that layer 73a is a rugged silicon layer, the specification clearly indicates that 73a indicates a tungsten layer. This tungsten layer begins the process of forming a *rugged metal* layer. Subsequently an additional tungsten layer is deposited by a non-replacement reaction "so that a tungsten layer 73b is *deposited on* the tungsten layer 73a as shown in FIG. 3(b)." Column 5, lines 42-47.

In summary, a non-rugged polysilicon electrode 2 is first formed; a replacement reaction is performed on this non-rugged silicon layer to form a surface tungsten layer 73a; and a

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subsequent tungsten layer 73b is deposited on top of this first tungsten layer 73a. Nowhere in the reference is it either taught or suggested that the initial silicon layer is rugged prior to forming the replacement reaction. While the replacement reaction may leave a rugged surface, that rugged surface is formed of the first tungsten layer 73a, and furthermore the subsequent process is not a replacement reaction, but rather a deposition reaction to form the second tungsten layer 73b.

Thus, the Examiner has incorrectly identified tungsten layer 73a as a rugged silicon layer, and nowhere does the reference teach or suggest a sequence in which a rugged silicon structure is first formed, and a substitution reaction performed thereafter.

Accordingly, Applicant respectfully submits that Sekine does not teach or suggest each and every element of independent Claim 6 and therefore fails to anticipate it or render it obvious. Dependent Claims 7-12 and 29-30 each depend from independent Claim 6 and recite further distinguishing features of particular utility. Accordingly, Applicant respectfully submits that Claim 7-12 and 29-30 are also allowable over the art of record.

Two dependent claims deserve special attention. Claims 29-30 recite all the features of independent Claim 1 and furthermore recite that the silicon rugged structure "comprises a hemispherically grained silicon structure." In finding these claims anticipated by Sekine, the Examiner states that Sekine teaches "the rugged structure of silicon atoms comprises HGS [sic: HSG] (Column 1, lines: 55-57)." Applicant submits that the Examiner points to the *background* teachings of Sekine, and not the preferred embodiment of Sekine. Not only does the Examiner fail to produce a suggestion for combining this background teaching with the preferred embodiment, but this background teaching is actually denigrated as undesirable by the Sekine reference itself. In particular, Sekine refers to a prior art process in which tungsten is *deposited* on HSG silicon, not a process in which a substitution reaction is used. Furthermore, Sekine teaches that this prior art process in which HSG is followed by metal deposition is undesirable because it results in flattening and therefore loss of the increased surface area:

Recently there has been developed and put to use a technique to roughen a surface of such phosphorus-doped polysilicon by way of HSG until the surface thereof is almost doubled.

If, however, a tungsten film is deposited to a thickness of at least 100 nm on the roughened surface of phosphorus-doped polysilicon, then the roughened surface of the phosphorus-doped polysilicon

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will be flattened, eliminating the increase of the surface area thereof ... Therefore, the surface of the phosphorus-doped polysilicon is no longer rough, but made flat and smooth, and, as a result, does not have the increased surface area.

Col. 1, line 34 to Col. 2, line 3.

Therefore, the Examiner has unfairly combined the background teachings of Sekine, which are taught as undesirable, with the preferred embodiment of Sekine, in which no HSG silicon formation is taught prior to the substitution reaction.

Further Restriction is Unwarranted

In the last response, Applicant added Claims 25-28. The Examiner states that Claims 25-28 constitute a separate species because they require forming a second electrode and a dielectric over the rugged surface of the substrate. Furthermore, the Examiner states that "since Applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits."

Applicant respectfully traverse the rejections with respect to Claims 25-27. Contrary to the Examiner's statements, the originally presented invention, filed in this case with a Preliminary Amendment along with the present continuation application on January 26, 2001, included both Claims 6-12 and Claims 20-24. In a Restriction Requirement mailed on June 19, 2001, the Examiner failed to take into consideration the added Claims 21-24. Note, by the way, that Claim 20 was originally grouped with Claims 6-12 *by the Examiner* in the original Restriction Requirement. Applicant subsequently pointed out the failure to acknowledge Claims 21-24 to the Examiner and the Examiner conducted examination on the merits on Claims 6-12 and 20-24. See, for example, Office Action dated July 18, 2001; Office Action dated January 3, 2002; Office Action dated June 19, 2002; Office Action dated March 28, 2003.

In this last listed Office Action, the Examiner had allowed Claims 6-12 and continued to reject Claims 20-24.

In order to facilitate prosecution, in view of the allowance of Claims 6-12, Applicant elected to cancel Claims 20-24 to hasten issuance of a patent for the present invention. The Examiner then reversed her allowance of Claims 6-12 such that Applicant has now effectively

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been forced to reduce the number of claims, despite the fact that independent Claim 20 had originally been grouped with Independent Claim 6 in the original Restriction Requirement.

In the latest Office Action, Applicant effectively reintroduced independent Claim 20 as new Claim 25 and simply added language to the claims to clarify the sequence of forming the metal electrode with a metal surface by a replacement reaction after forming the rugged silicon electrode.

The sequence of events clearly indicates that Claim 25 represents a claim that was originally grouped with Claims 6-12 by the Examiner herself, and was in fact examined by the Examiner and therefore was "originally presented" in the form of Claim 20. It is only because of the sequence of events which the Examiner allowed Claims 6-12, Applicant cancelled Claims 20-24 in order to hasten allowance and the Examiner then reversed her allowance, that Claim 25 does not continue to exist as originally numbered Claim 20. In view of this history, Applicant respectfully submits that it is patently unfair to now disallow re-entry of these claims into the case. Furthermore, its restriction at this point does not comply with 37 CFR § 1.142(b) and MPEP § 821.03, and is furthermore inconsistent with the Examiner's own original Restriction Requirement.

Accordingly, Applicant respectfully requests reconsideration of the restriction of Claims 25-27 and examination thereof. Additionally, Applicant respectfully submits that Claims 25-27 are allowable over the art of record for substantially the same reasons noted above with respect to Claims 6-12 and 29-30.

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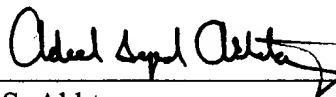
CONCLUSIONS

In view of the foregoing remarks, Applicant respectfully requests reconsideration of the claims and passage of the case to allowance. If, on the other hand, some issue remains that the Examiner feels can be addressed by Examiner Amendment, the Examiner is cordially invited to call the undersigned for authorization.

Respectfully submitted,

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